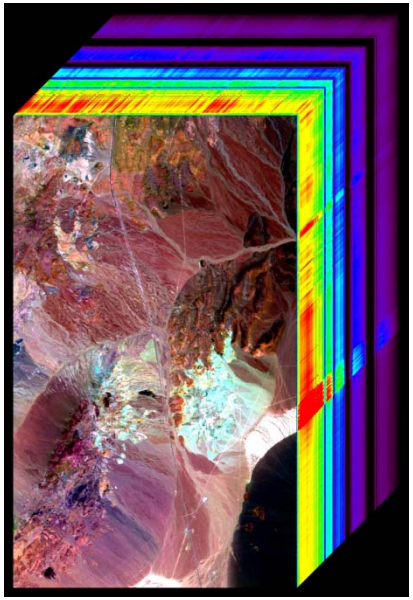
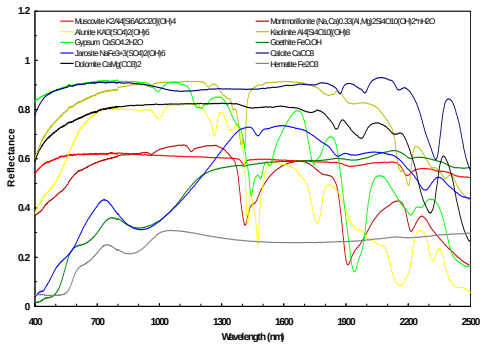
VSWIR Overarching Science Questions

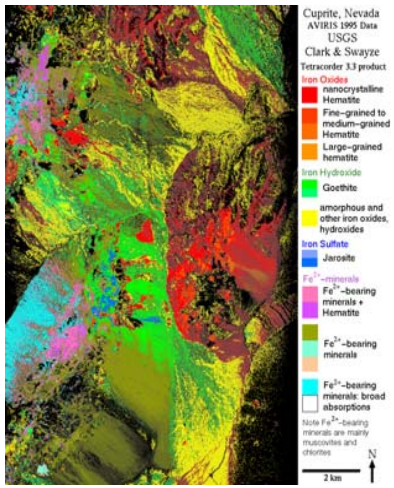
- VQ1. Pattern and Spatial Distribution of Ecosystems and their Components, (EM,JG)
  - What is the pattern of ecosystem distribution and how do ecosystems differ in their composition or biodiversity? [DS 195]
- VQ2. Ecosystem Function, Physiology and Seasonal Activity, (EM,JG)
  - What are the seasonal expressions and cycles for terrestrial and aquatic ecosystems, functional groups and diagnostic species? How are these being altered by changes in climate, land use, and disturbances? [DS 191, 195, 203]
- VQ3. Biogeochemical Cycles (SO, SU)
  - How are biogeochemical cycles for carbon, water and nutrients being altered by natural and human-induced environmental changes?
- VQ4. Changes in Disturbance Activity (RK,GA)
  - How are disturbance regimes changing and how do these changes affect the ecosystem processes that support life on Earth?
- VQ5. Ecosystem and Human Health, (PT,GG)
  - How do changes in ecosystem composition and function affect human health, resource use, and resource management?
- VQ6. Earth Surface and Shallow Water Substrate Composition (RG, HD)
  - What is the land surface soil/rock and shallow water substrate composition?

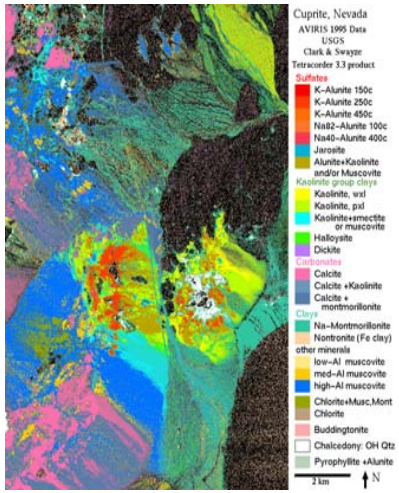
What is the distribution of the primary minerals and mineral groups on the exposed terrestrial surface? [DS 218]





Left: Imaging spectrometer measurements of exposed rock and soil. Above: Spectral signatures of select rock and soil forming minerals.





Above left and right: Spectroscopically derived maps of minerals in the 400 to 1500 nm and 1500 to 2500 nm spectral regions.

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he composition and distribution of the exposed rock and soil substrate of the terrestrial surface is not accurately known globally. Surface rock and soil composition is closely linked to an understanding of resources, hazards and is a major critical element of the Earth system.

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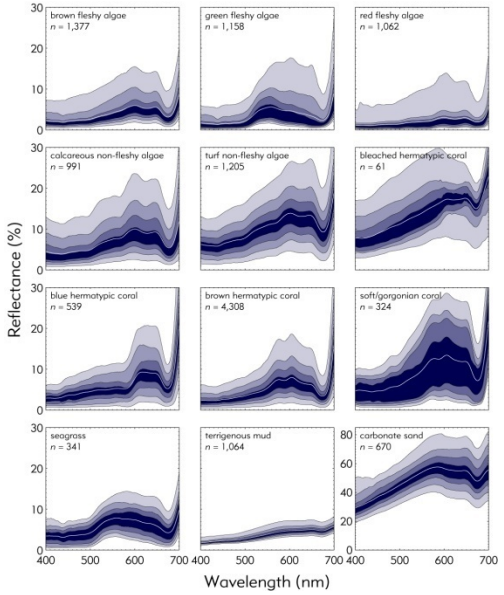
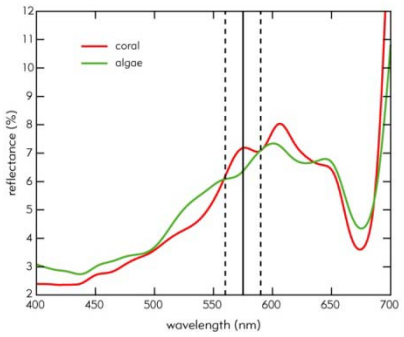
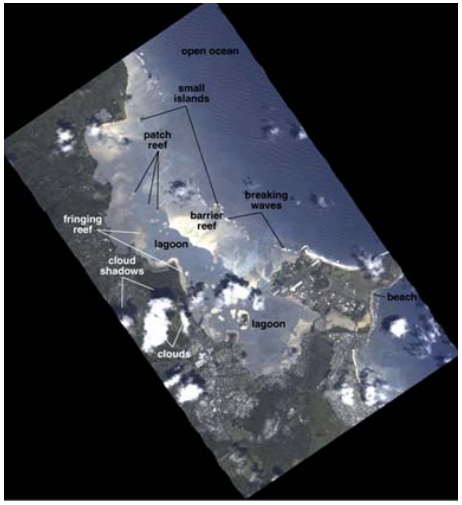
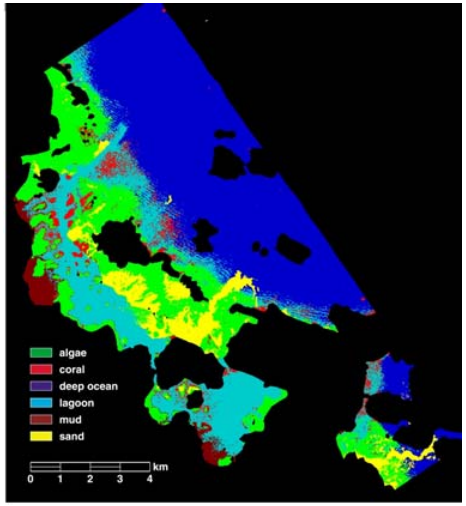
What is the surface composition (sand, rock, mud, coral, algae,SAV, etc) of the shallow water regions of the Earth?





Left: In situ spectral measurements of benthic materials. Above: Example spectral descrimination of algae and coral .





Above left: Imaging spectrometer measurements of Kaneoe Bay, Hawaii. Right: Shallow water bottom composition derived from spectral measurements

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he composition, distribution and seasonal variability of the materials in the observable shallow water coastal regions are poorly understood globally. The habits and resources of the coastal zone is close tied to the composition and structure of the substrate.

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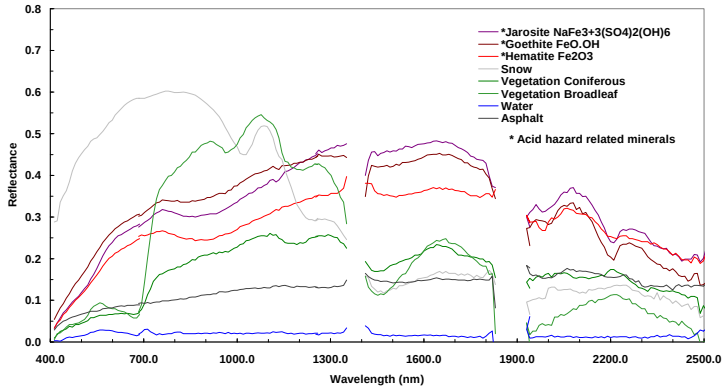
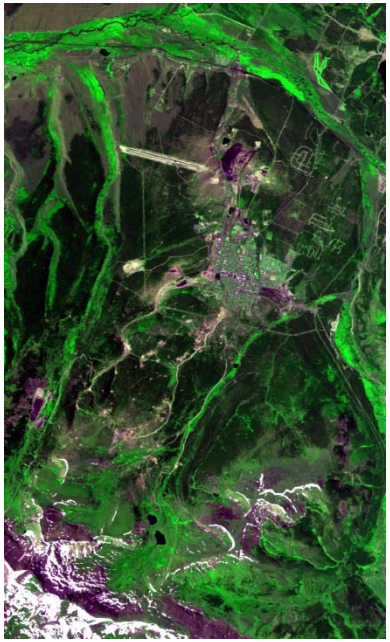
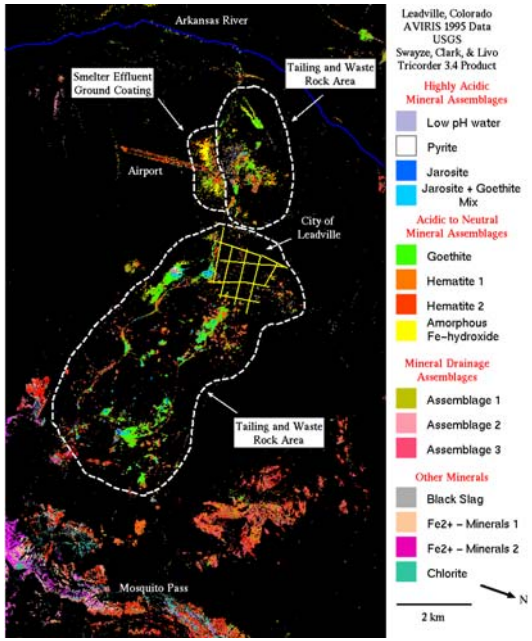
How can measurements of rock and soil composition be used to understand and mitigate hazards? [DS 114,227]



Left: Imaging spectrometer measurements of acid generating mineralogies at Leadville, CO.





Above left: Imaging spectrometer RGB image of the Leadville, CO region. Above right: Imaging spectroscopy derived map of acid generating mineralogies associated with mine waste.

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n some environmental setting both natural and human placed geological materials can cause a hazard to human health. Two examples are: (1) acid water drainage sulfate bearing mine waste and natural sulfate mineral occurance. (2) distribution and disturbance of asbestos bearing rocks.

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